

Media Workshop

The California Hydrogen Highway Network

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Overview

- California's Challenges
- Why Hydrogen?
- The California Hydrogen Highway Blueprint Plan
- Senate Bill 76
- Conclusions



Pollutants of Concern in California



90 percent of Californians are exposed to unhealthy levels of air pollution

- Ozone
 - Formed by ROG and NO_x + Sunlight
- Particulate Matter (PM)
 - Emitted and formed by NO_x, SO_x, ROG, ammonia
- Air Toxics
 - Diesel particles, 1,3-Butadiene, Benzene, etc.



Potential Impacts of Climate Change on California

Climate Changes



Temperature Increase



Precipitation Patterns and Extremes



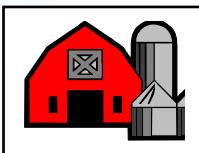
Sea Level Rise

Source: Anne Grambsch, 1998



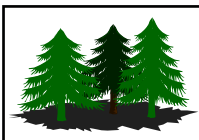
Health

Air Quality - Respiratory Illness
Weather-related Mortality
Infectious and Tropical Diseases



Agriculture

Crop Yields
Irrigation Demands



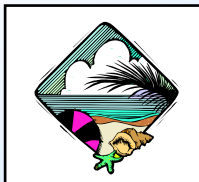
Forests

Forest Composition
Geographic Range of Forests
Forest Health and Productivity



Water Resources

Water Supply
Water Quality
Competition for Water



Coastal Areas

Erosion of Beaches
Inundation of Coastal Wetlands
Additional Costs to Protect Coastal Communities



Species and Natural Areas

Loss of Habitat and Species



Implications of Petroleum Dependence

- **Economic**

Higher gasoline and diesel fuel prices reduce the buying power of consumers and drive up the average cost of goods and services

- **Petroleum Supply Disruptions**

Increased vulnerability to external supply disruptions and geopolitical instability from foreign imports

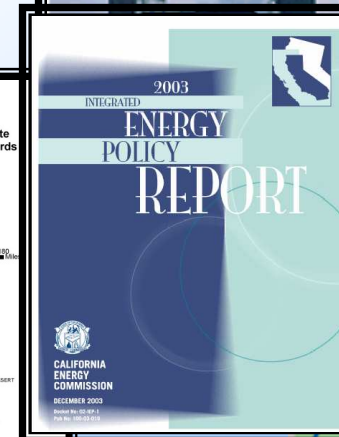
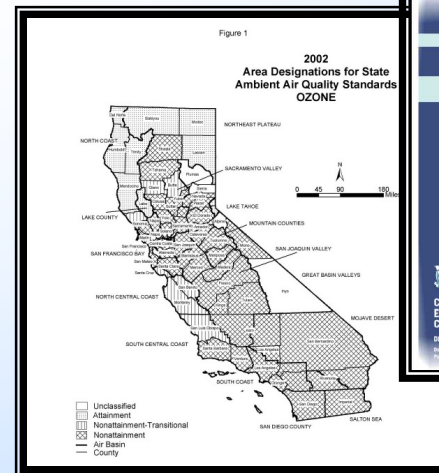
- **Environmental**

Increased petroleum usage leads to increases in toxic air contaminants, criteria pollutants and climate change emissions threatening public health and the environment



Why Hydrogen?

- **Environment**
 - Cars-- large source of pollution
 - Petroleum dependence-- multi-media pollution impacts
- **Health**
 - 1.7 million respiratory attacks and 6,500 deaths attributed to air pollution annually in California
- **Economy**
 - Sustainable fuel supply
 - New technology development
 - Innovation in transportation
- **Energy**
 - Diversity of feed stocks
 - Distributed generation
 - Renewable energy use



California Hydrogen Highway Net Blueprint Plan

- Executive Order S-7-04 formed the Ca H2 Net
- A Blueprint Plan was developed with extensive input from over 200 experts and resulted in:
 - Volume I - Report to the Governor and Legislature from the Executive Order Team
 - Volume II - Summary of the work of the Advisory Panel and Topic Teams
 - Five Topic Team Reports:
 - Societal Benefits
 - Rollout Strategy
 - Economy
 - Implementation
 - Public Education



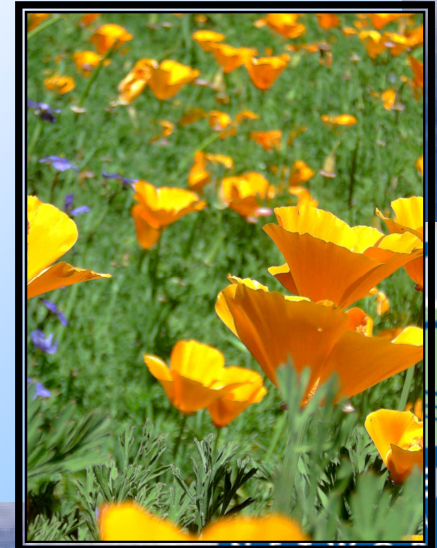
The CaH2Net's mission is...

- ... to assure that hydrogen infrastructure is in place to enable fuel cells and other hydrogen technologies to be used by consumers as those technologies reach commercial readiness.
- The CA H2 Net is a key part of California's strategy to achieve the State's vision of a secure energy future that simultaneously addresses our environmental, public health and economic challenges working in partnership with other components of the State's programs to advance energy efficiency and renewable energy.



Blueprint Plan Findings

- Phased approach to infrastructure implementation
- Environmental goals
- Shared risk

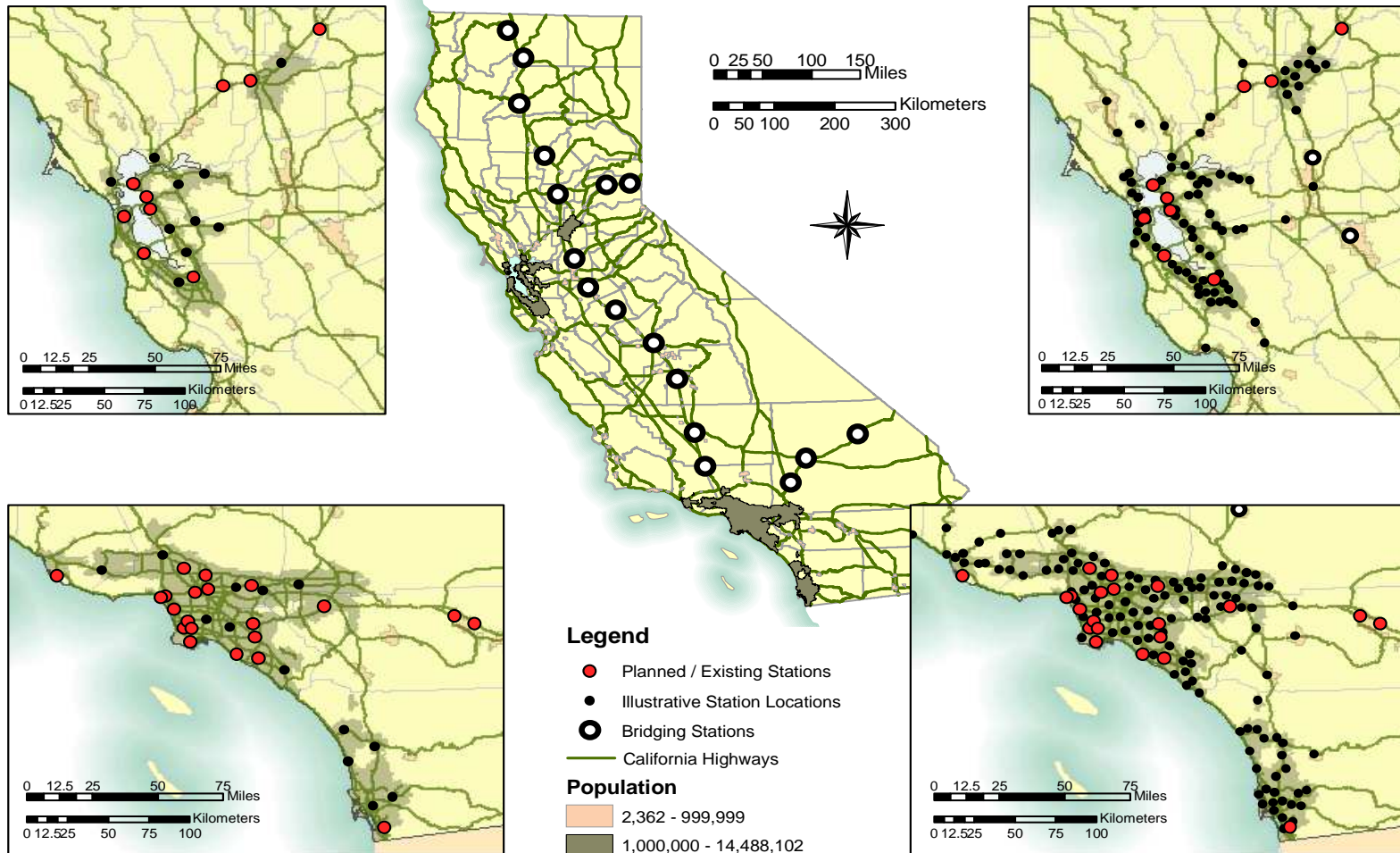


Blueprint Plan - A Phased Approach

Type of Hydrogen-Fueled Vehicle or Product	Number of Units Targeted / Estimated for Deployment (by Phase)		
	Phase 1: 50 to 100 Stations	Phase 2: 250 Stations (w/ Initial Lower Usage)	Phase 3: 250 Stations (w/ Expanded Usage)
Light-duty FCVs and H ₂ ICEVs from major manufacturers.	2,000	10,000	20,000
Heavy-duty FCVs or H ₂ ICEVs.	10	100	300
Stationary and off-road vehicle applications.	5	60	400
FCV = Fuel Cell Vehicle H ₂ ICEV = Hydrogen Internal Combustion Engine Vehicle			



Map Compilation



CALIFORNIA

HYDROGEN
HIGHWAY
NETWORK

Senate Bill No. 76

- Governor signed SB 76 on July 21, 2005
- Provides \$6.5 million for state-sponsored hydrogen demonstration projects until January 1, 2007
 - *Establishment of up to 3 hydrogen fueling station demonstration projects*
 - *State lease and purchase of hydrogen vehicles*
- Hydrogen fuel specifications



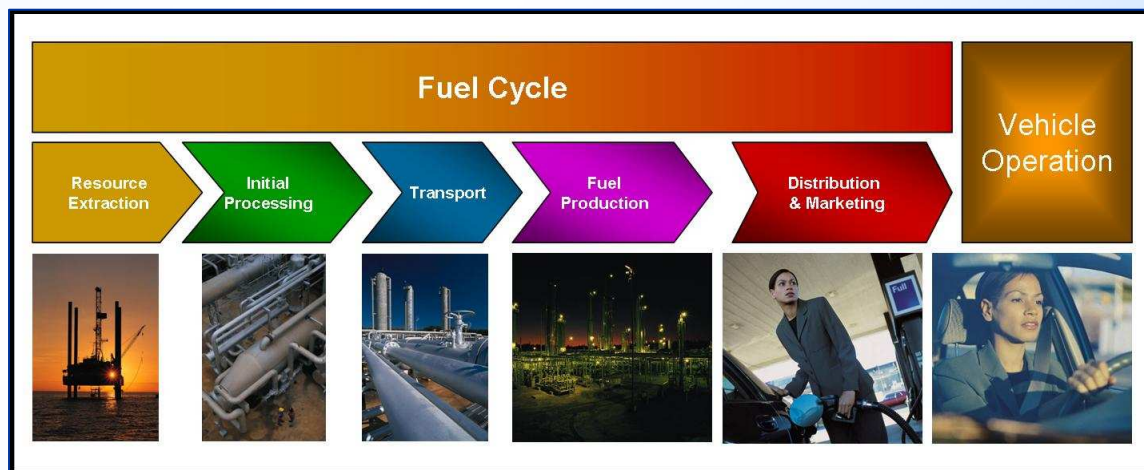
Station Requirements

- Public access
- Available convenient hours
- Location to enhance network operability
- Innovative design



Environmental Goals

- 30 % reduction in GHG
- 33 % production from new renewable sources
- No increase in toxic or criteria pollutants
- Use of renewable hydrogen generation or energy station concept with electricity production



Environmental Justice

- Include buffer zones with sensitive receptors (schools, hospitals residences, etc.)
- Mitigate adverse impacts to affected neighborhoods
- Meet with the Cal/EPA Environmental Justice Advisory Committee



Vehicles

- 12 hydrogen vehicles
 - Leased
 - Diverse fleet
 - mix of automakers, H2FCV and H2ICE
- 2 hydrogen shuttle buses
 - Purchased
 - Airport or university shuttle applications



Public Process

- Public bid process for stations and vehicles
- Cal/EPA Environmental Justice Committee meeting on siting criteria
- 3 Public workshops
 - Northern, Southern and Central California
 - H2 production and fueling bid criteria and location selection
- Consistent with ARB's Land Use Handbook
- 30 Day comment period for bid criteria



Reporting Requirements

- Reports to the Legislature every six months
- Report by December 31, 2006
 - Activity in other states
 - Siting criteria and actual site selection
 - Environmental impacts to communities
 - Business activity impacts



Additional Activities

- Facilitating commercialization
- Public education and outreach
- Zero emission vehicle regulations
- Stationary fuel cell commercialization



California Fuel Cell Partnership

- Formed January 1999
- Members include
 - Fuel cell and vehicle manufacturers
 - Energy providers
 - Government agencies



California Stationary Fuel Cell Collaborative



California Stationary Fuel Cell
Collaborative

- Members include
 - Federal, State and local government
 - Municipal utilities
 - National fuel cell organizations





- Buyers guide to the least-polluting vehicles on the market
- More than 45 models available
- Hybrids, super-clean gasoline powered and alternative fuel vehicles
- Search by manufacturer, technology type, or vehicle class



www.DriveClean.ca.gov



Our Goal Is Clean Air Everyday

Controlling emissions from today's technologies...



working towards tomorrow's zero emission technologies

